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Abstract

POST-IRRADIATION EXAMINATION OF C.E.G.B. FUEL ELEMENTS

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The aim of our examination is twofold. Firstly, to assist the reactor operator in the elimination of reactor shut-downs; these may be due to perforations in the fuel element can or physical change in the fuel element, either of which may adversely affect the operation of the reactor, or impede discharge from the reactor. Secondly, to provide information on the condition of the heat transfer surfaces of the can together with the extent of deformation of the uranium bar. Upon such data, reactor operation and the future design of fuel elements can be based.

The paper describes the techniques of remote handling, dismantling and examination of fuel elements which have been established to ensure that the maximum amount of information is obtained from a minimum number of remote operations. Attention is drawn to the ability resulting from the use of simple equipment, to change the emphasis of the examination.

Methods of optical examination are outlined and illustrations are given of the way in which deformation of fuel element components and the external surface of the can is assessed. The extent to which radiography can provide useful information is discussed and it is shown that precise measurements of fuel bar distortion can be made from radiographs when the geometry of projection from a point source is taken into account.

The requirements for leak detection in irradiated fuel elements are considered and it is shown that the ideal is most nearly achieved by bubble leak location which involves reducing the pressure above the surface of a liquid in which the element is immersed. Developments of this method permit

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the assessment of leak size and shape.

A description is given of techniques of sectioning fuel elements for metallographic examination, whereby distortion of the specimen is minimised. Facilities for investigating the properties of fuel element materials are described and illustrated by examples of the work currently in progress.

The problems of maintenance, decontamination and waste disposal, as they affect laboratory practice, are briefly discussed. Specific mention is made of a process for converting the swarf from machining operations into inert glass blocks.